

HIGH THROUGHPUT METHODS OF HLA TYPING

ABSTRACT OF THE DISCLOSURE

A method for determining an HLA genotype of a subject is disclosed. The method comprises (a) isolating template nucleic acid from the subject; (b) amplifying the template nucleic acid to generate sufficient product for each allele of at least one gene locus to be determined; (c) hybridizing the template nucleic acid with an immobilized array of capture oligonucleotides, each having a known nucleic acid sequence of an HLA allele; and (d) determining the particular capture oligonucleotide to which the template nucleic acid hybridizes, thereby determining the genotype of the subject. A number of additional methods that can eliminate or abbreviate additional steps are also described. Moreover, the present invention provides a method for determining tissue compatibility using the determined HLA genotype.

Table 1

| Primer | | | SEQUENCE (5'-3') | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
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| Primer | SEQUENCE (5' - 3') | MER | | | | | | | | | | | | | | | | |
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| | | C | C | A | T | A | C | A | T | C | G | T | C | T | G | C | A | A |
| C174 | HLA-B Ex3 11-28 | G | C | G | C | A | G | G | T | T | C | C | G | C | A | G | C | |
| C175 | HLA-B Ex2 229-245 | G | A | G | C | C | A | C | T | C | C | A | C | C | A | C | A | G |
| C176 | HLA-ABC Ex3 216-233 | G | G | G | T | A | C | C | A | G | C | A | G | G | A | C | G | C |
| C177 | HLA-A Ex3 63-80 | G | A | G | A | C | A | C | A | G | A | A | G | T | A | C | A | G |
| C178 | HLA-B & C Ex2 187-205 | G | C | C | G | C | G | G | T | C | C | A | G | C | A | G | C | T |
| C179 | HLA-B Ex3 120-136 | C | G | A | G | A | G | A | G | C | C | A | G | C | A | G | A | C |
| C180 | HLA-B Ex2 222-239 | C | G | C | G | A | G | A | G | T | C | C | A | G | G | A | T | C |
| C181 | HLA-B Ex2 119-136 | C | A | G | G | T | A | T | C | T | G | C | G | G | A | G | C | C |
| C182 | HLA-A & B Ex3 228-245 | C | C | A | C | T | C | C | A | T | G | A | G | G | T | A | T | T |
| C183 | HLA-B Ex2 5-24 | G | C | G | G | C | C | A | G | G | C | A | G | G | A | G | C | G |
| C184 | HLA-B Ex3 120-136 | C | C | T | C | C | A | G | G | T | A | G | G | C | T | C | A | A |
| C185 | HLA-A & B Ex3 195-213 | G | C | A | G | G | T | G | C | G | A | C | C | T | C | T | C | T |
| C186 | HLA-B Ex2 226-243 | G | G | A | C | C | T | G | C | G | G | A | C | C | C | T | G | C |
| C187 | HLA-B Ex2 244-227 | G | G | G | A | G | C | C | C | C | G | C | T | T | C | A | T | C |
| C188 | HLA-B & C Ex2 52-69 | C | G | C | C | A | C | G | A | G | T | C | C | G | A | G | A | A |
| C189 | HLA-B Ex2 116-133 | T | C | C | C | A | C | T | T | G | C | G | C | T | G | G | G | T |
| C190 | HLA-ABC Ex3 156-172 | G | A | G | C | C | T | G | C | G | C | C | C | C | G | T | C | G |
| C191 | HLA-B Ex3 44-60 | G | A | G | C | C | T | G | C | G | G | A | C | C | C | T | G | C |
| C192 | HLA-B Ex2 227-244 | C | G | A | G | T | G | G | C | C | C | T | G | C | C | T | G | C |
| C193 | HLA-B Ex2 222-239 | G | C | T | A | C | G | T | G | G | A | C | G | A | C | A | C | C |
| C194 | HLA-B Ex2 76-94 | C | C | T | C | G | T | C | A | G | T | C | G | T | G | C | C | T |
| C195 | HLA-B Ex2 207-225 | T | C | T | C | G | G | T | A | A | G | T | C | T | G | C | C | T |
| C196 | HLA-B Ex2 207-226 | T | A | T | T | A | G | G | A | C | G | A | G | A | C | A | G | |
| C197 | HLA-A Ex2 174-192 | C | G | T | C | G | T | A | G | G | C | G | T | A | C | T | G | C |
| C198 | HLA-B & C Ex3 69-87 | C | G | A | C | G | C | C | G | C | G | A | G | C | C | A | G | A |
| C199 | HLA-A Ex2 113-130 | G | A | G | C | C | C | G | T | C | C | A | C | C | G | C | A | C |
| C100 | HLA-ABC Ex3 216-233 | T | C | A | C | A | G | A | C | T | G | A | C | C | G | A | G | C |
| C101 | HLA-A Ex2 210-229 | A | C | G | G | A | A | T | G | T | G | A | A | G | G | C | C | A |
| C102 | HLA-A Ex2 191-209 | A | G | C | G | A | C | G | C | C | G | A | G | C | C | A | G | |
| C103 | HLA-A Ex2 111-127 | G | G | C | C | G | G | A | T | T | G | A | A | G | G | C | C | A |
| C104 | HLA-A Ex2 186-184 | G | A | T | HLA-A Ex2 186-184 | A | G | T | A | T | T | G | G | G | A | C | G | A |
| C105 | HLA-A Ex2 152-170 | T | C | A | C | A | G | A | C | T | G | A | C | C | G | A | G | C |
| C106 | HLA-A & B Ex2 210-229 | C | C | C | G | G | C | C | C | G | G | C | A | G | T | G | G | A |
| C107 | HLA-A Ex2 37-53 | G | T | G | G | A | C | A | G | C | A | G | C | A | G | G | A | |
| C108 | HLA-A Ex2 149-167 | A | T | G | T | A | A | T | C | C | T | T | G | C | C | G | T | C |
| C109 | HLA-A Ex3 80-100 | C | A | C | T | C | C | A | C | G | C | A | C | G | T | G | C | A |
| C110 | HLA-A Ex3 212-229 | A | G | C | G | C | A | G | G | T | C | C | T | C | G | T | C | A |
| C111 | HLA-A Ex3 105-123 | C | C | G | T | C | G | T | A | G | G | C | G | C | T | G | C | T |
| C112 | HLA-A Ex3 71-88 | | | | | | | | | | | | | | | | | |

Table 1

| Primer | | SEQUENCE (5' - 3') | | | | | | | | | | | | | | | | | | | | MER | | | | | | | | | | |
|--------------------------|----|--------------------|---|---|---|---|---|---|---|---|---|----|----|----|----|----|----|----|----|----|----|-----|----|----|----|----|----|----|----|----|----|----|
| C2F32T | 5' | HLA-C Ex2 14-32 | C | A | T | G | A | G | G | T | A | T | T | T | C | T | A | C | A | C | C | G | C | T | | | | | | | | 22 |
| C2F25A | 5' | HLA-C Ex2 5-25 | C | A | C | T | C | C | A | T | G | A | G | G | T | A | T | T | T | C | G | A | | | | | | | | | | 20 |
| C2F25C | 5' | HLA-C Ex 5-25 | C | A | C | T | C | C | A | T | G | A | G | G | T | A | T | T | T | C | T | C | | | | | | | | | | 20 |
| C2F32C | 5' | HLA-C Ex2 14-32 | T | G | A | G | G | T | A | T | T | T | C | T | A | C | A | C | C | G | C | C | | | | | | | | | | 20 |
| C3R195G | 3' | HLA-C Ex 3 195-213 | C | C | T | C | C | A | G | G | T | A | G | G | C | T | C | T | C | T | C | | | | | | | | | | | 19 |
| C3R195C | 3' | HLA-C Ex3 195-213 | C | T | C | C | A | G | G | T | A | G | G | C | T | C | T | C | C | G | | | | | | | | | | | | 18 |
| C3R076A | 3' | HLA-C Ex3 76-93 | C | C | T | T | G | C | C | G | T | C | G | T | A | G | G | C | G | T | | | | | | | | | | | | 18 |
| C3R076C | 3' | HLA-C Ex3 76-93 | C | C | T | T | G | C | C | G | T | C | G | T | A | G | G | C | G | A | | | | | | | | | | | | 18 |
| C3R076T | 3' | HLA-C Ex3 76-93 | C | C | T | T | G | C | C | G | T | C | G | T | A | G | G | C | G | A | | | | | | | | | | | | 18 |
| C3R075TA | 3' | HLA-C Ex3 75-93 | C | C | T | T | G | C | C | G | T | C | G | T | A | G | G | C | T | A | | | | | | | | | | | | 18 |
| C2F216A | 5' | HLA-C Ex2 198-216 | T | A | C | A | A | G | C | G | C | C | A | G | G | C | A | C | A | G | A | | | | | | | | | | | 19 |
| | | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 |
| Class I Capture Oligo A1 | | | A | C | G | C | C | T | A | C | G | A | C | G | G | C | A | A | G | G | A | T | T | A | C | A | T | C | G | C | C | |
| Class I Capture Oligo A2 | | | G | A | T | G | G | A | G | C | C | G | C | G | G | T | G | G | A | T | A | G | A | G | C | A | A | G | G | A | G | G |
| Class I Capture Oligo B1 | | | | | | | | | | | | | | | | | | G | A | C | A | G | C | G | A | C | G | C | C | | | |
| Class I Capture Oligo B2 | | | | | | | | | | | | | | | | | | A | A | C | A | G | A | G | C | A | G | A | G | C | C | |
| | | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 |

DR2R37F-2R

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| DR17 | 3' | DR2R37F-2R | T | C | G | C | T | G | T | C | G | A | A | G | C | G | C | A | C | G | A | 19 | T |
| DR18 | 3' | DR2R37L-1R | | | G | C | T | G | T | C | G | A | A | G | C | G | C | A | C | G | A | 18 | C |
| DR19 | 3' | DR2R37N-2R | C | | G | C | T | G | T | C | G | A | A | G | C | G | C | A | C | G | T | 19 | A |
| DR20 | 3' | DR2R37S-1R | | | G | C | T | G | T | C | G | A | A | G | C | G | C | A | C | G | G | 17 | C |
| DR21 | 3' | DR2R37Y-1R | | | G | C | T | G | T | C | G | A | A | G | C | G | C | A | C | G | T | 18 | T |
| DR22 | 5' | DR2S37YA-1 | C | G | C | T | G | T | A | G | C | G | C | G | C | G | T | | | | | 18 | A |
| DR23 | 3' | DR2R47F-2R | | | T | C | C | G | A | C | C | C | C | G | G | A | | | | | | 16 | T |
| DR24 | 5' | DR2S52B-3 | G | A | G | T | A | C | C | G | C | C | G | G | T | G | A | | | | | 18 | G |
| DR25 | 3' | DR2R57D-1R | C | | T | G | T | C | C | A | G | T | A | C | T | C | G | C | A | T | | 19 | A |
| DR26 | 3' | DR2R57S-1R | | | T | G | T | C | C | A | G | T | A | C | T | C | G | C | G | C | T | 19 | T |
| DR27 | 3' | DR2R57V-1R | C | T | G | T | C | C | A | G | G | A | C | C | T | C | G | C | G | A | | 21 | A |
| DR28 | 3' | DR2R56E-1R | T | C | A | G | C | T | G | T | C | T | C | C | A | G | A | A | | | | 19 | T |
| DR29 | 3' | DR2R67F-2R | C | G | C | C | T | G | T | C | T | T | C | C | A | G | A | T | | | | 19 | A |
| DR30 | 3' | DR2R67I-2R | C | C | C | G | C | T | C | G | T | C | C | A | G | A | | | | | | 18 | C |
| DR31 | 3' | DR2R70QR-3 | C | A | C | G | C | G | C | C | C | C | C | C | T | C | T | G | | | | 15 | G |
| DR32 | 3' | DR2R71A-2R | | | C | A | C | C | G | C | G | C | C | C | C | G | C | | | | | 19 | G |
| DR33 | 3' | DR2R74E-1R | | | T | G | C | A | A | T | A | G | G | T | G | T | C | C | A | C | T | 19 | C |
| DR34 | 3' | DR2R74L-1R | | | T | G | C | A | G | T | A | G | G | T | G | T | C | C | A | C | A | 19 | C |
| DR35 | 3' | DR2R74Q-2R | G | T | G | T | C | T | G | C | A | G | T | A | T | T | G | C | C | C | T | 24 | C |
| DR36 | 3' | DR2R74R-1R | G | T | G | T | C | T | G | C | A | G | T | A | T | T | G | C | C | C | C | 23 | G |
| DR37 | 3' | DR2R76G-1R | | | | | | | | | | | | | | | | | | | | 17 | G |
| DR38 | 3' | DR2R81Y-1R | C | T | C | T | C | A | C | C | A | A | C | C | T | C | T | A | G | T | A | 23 | T |
| DR39 | 3' | DR2R86G-1R | T | G | C | A | C | T | G | T | G | A | A | G | C | T | C | A | C | C | A | 19 | G |
| DR40 | 3' | DR2R86V-1R | C | T | G | C | A | C | T | G | T | G | A | A | G | C | T | C | C | A | G | 20 | T |
| DR41 | 3' | DR2R78A-1R | C | C | C | C | G | T | A | G | C | T | A | T | T | C | T | C | A | A | | 20 | T |
| DR42 | 3' | DR2R74C-1R | | | | | | | | | | | | | | | | | | | | 18 | G |
| DR43 | 3' | DR2R74T-1R | | | | | | | | | | | | | | | | | | | | 18 | G |
| DR44 | 3' | DR2R60T-1R | C | C | T | T | C | T | G | C | T | A | A | G | T | C | C | A | C | C | T | 19 | C |
| DR45 | 3' | DR2R60G-1R | T | C | C | T | C | T | G | C | T | T | T | C | C | A | G | G | | | | 19 | C |
| DR46 | 3' | DR2R85A-1R | | | A | C | A | G | T | G | A | A | G | C | C | T | C | C | A | C | A | 19 | C |
| DR47 | 3' | DR2R47F | C | T | C | C | G | T | C | A | C | C | C | C | C | G | A | | | | | 17 | T |
| DR48 | 3' | DR2R47?-1R | C | T | C | C | G | T | C | A | C | C | C | C | C | G | T | A | | | | 18 | T |
| DR49 | 3' | DR2R30a | C | | | | | | | | | | | | | | | | | | | 21 | C |
| DR50 | 3' | DR2R30b | C | T | C | C | T | C | C | T | G | G | T | A | T | G | G | A | G | T | G | 21 | T |
| DR51 | 3' | DR2R37a | | | T | C | G | C | T | G | T | C | G | A | A | G | C | A | C | G | T | 20 | G |
| DR52 | 3' | DR2R37b | | | C | G | C | T | G | T | C | G | A | A | G | C | C | A | C | G | A | 19 | T |
| DR53 | 3' | DR2R37c | | | C | G | C | T | G | T | C | G | A | A | G | C | C | A | C | G | T | 19 | G |
| DR54 | 3' | DR2R37d | T | C | G | C | T | G | T | C | G | A | A | G | C | C | G | C | A | G | A | 19 | T |
| DR55 | 3' | DR2R37e | T | C | G | C | T | G | T | C | G | A | A | G | C | C | G | C | A | C | G | 19 | T |
| DR56 | 3' | DR2R38a | A | C | G | T | C | G | T | C | G | A | A | G | C | C | G | C | A | C | G | 20 | C |



Table 3

| | 5' Primer | 3' Primer | Specificity | Size (bp) |
|-----|--------------|-----------|--------------------------------------|-----------|
| A01 | 1 C1099 | C1137 | A*0101, 0102 | 629 |
| A02 | 4 C1099 | C1030 | A*3601 | 630 |
| A03 | 2 C1108 | C1113 | A*0201-17 | 489 |
| A04 | 3 C1103 | C1110 | A*0301,0302 | 628 |
| A05 | 15 C1102 | C1029 | A*1101,1102,6601 | 552 |
| A06 | 6 C1104 | C1085 | A*2301 | 557 |
| A07 | 5 C1097 | C1113 | A*2301,A*2401-07 | 464 |
| A08 | 7 C1104 | C1031 | A*2402-05, 2407 | 557 |
| A09 | 10 C1106 | C1109 | A*2501 | 400 |
| A10 | 8 C1077 | C1029,021 | A*2501,2601,2603,2605,6601,6602,4301 | 170 |
| A11 | 9 C1041 | C1109 | A*2501,2601-05,6601,6602,3401,3402 | 440 |
| A12 | 11 C1101 | C1109 | A*2601,2602,2604,4301 | 400 |
| B01 | 12 C1034 | C1109 | A*4301 | 442 |
| B02 | 13 C1077,141 | C1030 | A*3401,3402 | 170 |
| B03 | 14 C1102,142 | C1109 | A*3401,3402,6601,6602 | 419 |
| B04 | 16 C1034 | C1111 | A*2901,2902 | 465 |
| B05 | 17 C1107 | C1112 | A*3001-05 | 561 |
| B06 | 18 C1138 | C1143 | A*3101 | 198 |
| B07 | 19 C1033 | C1072 | A*3201 | 259 |
| B08 | 21 C1033 | C1111 | A*3201,7401 | 628 |
| B09 | 20 C1138 | C1136 | A*3301-03 | 200 |
| B10 | 22 C1102 | C1113 | A*6801,6802,6901 | 447 |
| B11 | 23 C1102 | C1032 | A*6901 | 383 |
| B12 | 24 C1120 | C1100 | A*8001 | 494 |
| C01 | 25 C1120 | C1133 | A*01,*11,*3601,*3401,*8001 | 300 |
| C02 | 79 C1051 | C1059 | B*5101-05,51v,51GAC,5201 | 401 |
| C03 | 80 C1041 | C1059 | B*5101-05,51v,51GAC,7801-02,1509 | 451 |
| C04 | 81 C1040 | C1059 | B*5201 | 440 |

Table 26

| | 5' Primer | 3' Primer | Specificity | Size (bp) |
|-----|-----------|-----------|--|-----------|
| E05 | 50 C1042 | C1056 | B*5801-03 | 374 |
| E06 | 49 C1051 | C1065 | B*5801,5104,5301,1513 | 319 |
| E07 | 53 C1037 | C1057 | B*1801,1802 | 458 |
| E08 | 41 C1094 | C1070 | B*4001,4007 | 607 |
| E09 | 40 C1089 | C1061 | B*4001-04,4006-08,4701 | 627 |
| E10 | 38 C1089 | C1090 | B*4002-06,4008,4101,4102,4501,45v,4901,5001,4402-05,4701 | 566 |
| E11 | 33 C1051 | C1058 | B*4901,5901 | 385 |
| E12 | 32 C1094 | C1067 | B*4901,5001,4005,2704,2706,45v | 635 |
| F01 | 57 C1134 | C1074 | B*5401 | 421 |
| F02 | 55 C1080 | C1058 | B*5401,5501,5502,5601,4501,45v,5001 | 383 |
| F03 | 54 C1052 | C1074 | B*5501,5502,5601,5602,7301,3906 | 422 |
| F04 | 56 C1047 | C1076 | B*5601,5602 | 551 |
| F05 | 58 C1094 | C1095,096 | B*2701-09 | 149/150 |
| F06 | 75 C1041 | C1065 | B*3501-04,3506-09,3511,5301,1502,1513,5104,1521,4406 | 369 |
| F07 | 76 C1038 | C1075 | B*3501-13,18,7801-02,1522 | 128 |
| F08 | 59 C1038 | C1055 | B*3701,B*4406,B51GAC | 606 |
| F09 | 60 C1040 | C1131 | B*3701,3902,3908 | 422 |
| F10 | 37 C1040 | C1063 | B*4101,4102 | 605 |
| F11 | 63 C1047 | C1063 | B*4201,42v | 594 |
| F12 | 66 C1078 | C1079 | B*4601 | 459 |
| G01 | 61 C1040 | C1069 | B*4701 | 414 |

Table 4

| Tray | Mix | Primer S | Primer AS | label | |
|------|-------|----------|-----------|----------|--|
| A01 | DRM01 | DR13 | DR31 | DR2R70QR | DRB1*0102 |
| A02 | DRM02 | DR13 | DR20 | DR2R37S | DRB1*0101,0102,0103,0104 |
| A03 | DRM03 | DR13 | DR30 | DR2R67I | DRB1*0103 |
| A04 | DRM04 | DR13 | DR39 | DR2R86G | DRB1*0101,0103 |
| A05 | DRM05 | DR13 | DR40 | DR2R86V | DRB1*0102,0104 |
| A06 | DRM06 | DR02 | DR39 | DR2R86G | DRB1*1001 |
| A07 | DRM07 | DR02 | DR25 | DR2R57D | DRB1*1001 |
| A08 | DRM08 | DR09 | DR15 | DR2R30H | DRB1*1503 |
| A09 | DRM09 | DR09 | DR17 | DR2R37F | DRB1*1608 |
| A10 | DRM10 | DR09 | DR23 | DR2R47F | DRB1*1501,1502,1503,1504,1505,1506,1508,1510 |
| A11 | DRM11 | DR09 | DR48 | DR2R477 | DRB1*1507,16XX |
| A12 | DRM12 | DR09 | DR25 | DR2R57D | DRB1*1502 |
| B01 | DRM13 | DR09 | DR30 | DR2R67I | DRB1*1510,1605,1607 |
| B02 | DRM14 | DR09 | DR29 | DR2R67F | DRB1*1601,16037,1604 |
| B03 | DRM15 | DR09 | DR32 | DR2R71A | DRB1*15XX |
| B04 | DRM16 | DR09 | DR34 | DR2R74L | DRB1*1604 |
| B05 | DRM17 | DR09 | DR39 | DR2R86G | DRB1*1502,16XX |
| B06 | DRM18 | DR09 | DR40 | DR2R86V | DRB1*1501,1503,1504,1505,1506,1507,1509,1510 |
| B07 | DRM19 | DR10 | DR12 | DR17-1R | DRB1*0301,0304,5,6,8-16 |

| Tray | Mix | Primer S | Primer AS | label | |
|------|-------|----------|-----------|----------|---|
| B08 | DRM20 | DR10 | DR21 | DR2R37Y | DRB1*11XX,1303,07,11-14,17,21-25,30,33,37,38,44,45,1425 |
| B09 | DRM21 | DR10 | DR19 | DR2R37N | DRB1*0301,02,05-15,1109,16,20,28,1301,02,05,06,09,10,15,16,18,20,26-29,31,32,34-36,39-43,1402,03,06,09,12,13,17-19,21,24,27,29,30,33 |
| B10 | DRM22 | DR10 | DR17 | DR2R37F | DRB1*1110,12,13,17,1308,19,1401,04,05,07,08,10,11,14-16,20,22,23,26,28,31,32,34-36 |
| B11 | DRM23 | DR10 | DR23 | DR2R47F | DRB1*0301,04,05,07-14,1101-16,18-36,39,1301,02,04-06,14-18,20-25,27-31,34,357,39,41-45,1417,21,30,33,35, |
| B12 | DRM24 | DR10 | DR48 | DR2R47? | DRB1*0302,03,06,1117,37,1303,07,08,12,13,19,26,32,33,36-38,40,1401-16,18-20,22-29,31,32,34,36 |
| C01 | DRM25 | DR10 | DR25 | DR2R57D | DRB1*0301-07,11,13-16,1301,02,05-11,14-20,22-25,27-29,34-37,39-42,44,1402,03,06,09,12,14,15,17-21,23,24,27,29,30,33,36 |
| C02 | DRM26 | DR10 | DR26 | DR2R57S | DRB1*0312,1303,04,12,13,21,30,32,33,38,1413, |
| C03 | DRM27 | DR10 | DR27 | DR2R57V | DRB1*1331 |
| C04 | DRM28 | DR10 | DR28 | DR2R58E | DRB1*11XX,1411, |
| C05 | DRM29 | DR10 | DR29 | DR2R67F | DRB1*1101,03-06,09-12,15,22-25,27-30,32,33,35,37-39,1305,07,11,14,18,21,24,26,42,1415,22,25,27 |
| C06 | DRM30 | DR10 | DR30 | DR2R67I | DRB1*1102,14,16,20,21,1301-04,08,10,15,16,1922,23,27,28,31-41,45,1416 |
| C07 | DRM31 | DR10 | DR31 | DR2R70QR | DRB1*1126,34,1344,1402,06,09,13,17,20,29,30,33 |
| C08 | DRM32 | DR10 | DR34 | DR2R74L | DRB1*0820,1123,25,1313,18,1403,12,27 |
| C09 | DRM33 | DR10 | DR46 | DR2R85? | DRB1*1106,21,1429 |
| C10 | DRM34 | DR10 | DR39 | DR2R86G | DRB1*0302,05,09,14,17,1101,08-12,14,15,19,20,23,24,26-29,31-33,37,39,1302,03,05,07,12-14,21,23,25,26,29-31,33,34,36-39,41,45,1402,03,07,09,13,14,19,22,24,25,27,30,36 |
| C11 | DRM35 | DR10 | DR40 | DR2R86V | DRB1*0301,03,04,06-08,10-13,15,16,0820,1102-04,06,07,13,16-18,21,25,34-36,38,1301,04,06,08-11,15,18-20,22,24,27,28,32,35,40,42-44,1401,05,06,08,12,16-18,20,21,23,26,29,32-35 |
| C12 | DRM36 | DR07 | DR21 | DR2R37Y | DRB1*0801-08,10-15,17-19,1105,1317 |
| D01 | DRM37 | DR07 | DR18 | DR2R37L | DRB1*1201-04,1206 |

| Tray | Mix | Primer S | Primer AS | label |
|------|-------|----------|-----------|---|
| D02 | DRM38 | DR07 | DR23 | DRB1*0817,1105,1201-06,1317 |
| D03 | DRM39 | DR07 | DR48 | DRB1*0801-17,18,19,21,1404,11,15,28,31 |
| D04 | DRM40 | DR07 | DR26 | DRB1*0801,03,05,06,10,12,14,16-19W |
| D05 | DRM41 | DR07 | DR25 | DRB1*0802,04,09,13,15,21,1105,1204,1317,1411,15 |
| D06 | DRM42 | DR07 | DR27 | DRB1*1201-03,05,06 |
| D07 | DRM43 | DR07 | DR28 | DRB1*1105,1204,1411 |
| D08 | DRM44 | DR07 | DR44 | DRB1*0808,15,1404,28,31 |
| D09 | DRM45 | DR07 | DR45 | DRB1*1201-03,05,06 |
| D10 | DRM46 | DR07 | DR29 | DRB1*0801,02,04-09,11,16,17,21,1105,1202,1415 |
| D11 | DRM47 | DR07 | DR34 | DRB1*0801-04,06-19,,21,1415 |
| D12 | DRM48 | DR07 | DR46 | DRB1*0812,1201,02,04-06,1428 |
| E01 | DRM49 | DR07 | DR39 | DRB1*0801-03,05,07-09,11,13-19,21,1105 |
| E02 | DRM50 | DR07 | DR40 | DRB1*0804,06,10,12,1201-06,1404,11,15,28,31 |
| E03 | DRM51 | DR08 | DR20 | DRB1*0406,19-21 |
| E04 | DRM52 | DR08 | DR21 | DRB1*0401-05,07-18,22-36,1122,1410 |
| E05 | DRM53 | DR08 | DR23 | DRB1*0428,35,1122 |
| E06 | DRM54 | DR08 | DR26 | DRB1*0405,09-12,17,24,28-30 |
| E07 | DRM55 | DR08 | DR25 | DRB1*0401-04,06-08,13,14,16,18-23,25-27,31-36 |
| E08 | DRM56 | DR08 | DR28 | DRB1*0415,1122 |
| E09 | DRM57 | DR08 | DR29 | DRB1*0415,25,36,1122 |

| Tray | Mix | Primer S | Primer AS | label | |
|------|-------|----------|-----------|---------|--|
| E10 | DRM58 | DR08 | DR30 | DR2R67I | DRB1*0402,12w,14,18 |
| E11 | DRM59 | DR08 | DR70 | DR2R70B | DRB1*0401,09,13,16,21,22,26,33-35 |
| E12 | DRM60 | DR08 | DR33 | DR2R74E | DRB1*0403,06,07,11,17,20,22,27,1410 |
| F01 | DRM61 | DR08 | DR34 | DR2R74L | DRB1*0412,18,25,31 |
| F02 | DRM62 | DR08 | DR39 | DR2R86G | DRB1*0401,05,07-09,14,16,17,19-21,24,26,28-31,33-35,1122 |
| F03 | DRM63 | DR08 | DR40 | DR2R86V | DRB1*0402-04,06,10-13,15,18,22,23,25,27,32,36,1410 |
| F04 | DRM64 | DR11 | DR17 | DR2R37F | DRB1*0701,03,04 |
| F05 | DRM65 | DR11 | DR39 | DR2R86G | DRB1*0701,03,04 |
| F06 | DRM66 | DR01 | DR27 | DR2R57V | DRB1*0901 |
| F07 | DRM67 | DR01 | DR39 | DR2R86G | DRB1*0901 |
| F08 | DRM68 | DR03 | DR20 | DR2R37S | DRB3*0203 |
| F09 | DRM69 | DR03 | DR21 | DR2R37Y | DRB1*1130 |
| F10 | DRM70 | DR03 | DR19 | DR2R37N | DRB3*0206? |
| F11 | DRM71 | DR03 | DR17 | DR2R37F | DRB3*0301-03 |
| F12 | DRM72 | DR03 | DR26 | DR2R57S | DRB3*0208 |
| G01 | DRM73 | DR03 | DR25 | DR2R57D | DRB3*0107,0201-06,10-13 |
| G02 | DRM74 | DR03 | DR35 | DR2R74Q | DRB3*0107,0201-03,05-13,0301,02 |
| G03 | DRM75 | DR03 | DR36 | DR2R74R | DRB3*0101-06 |
| G04 | DRM76 | DR03 | DR39 | DR2R86G | DRB3*0101-07,0202,03,05-13,0303 |
| G05 | DRM77 | DR03 | DR40 | DR2R86V | DRB3*0201,04,0301,02 |

| Tray | Mix | Primer S | Primer AS | label | |
|------|-------|----------|-----------|---------|-------------------------|
| G06 | DRM78 | DR05 | DR25 | DR2R57D | DRB3*0107 |
| G07 | DRM79 | DR05 | DR39 | DR2R86G | DRB3*0101-07 |
| G08 | DRM80 | DR06 | DR37 | DR2R76G | DRB4*0102 |
| G09 | DRM81 | DR06 | DR38 | DR2R81Y | DRB4*0101-04 |
| G10 | DRM82 | DR06 | DR40 | DR2R86V | DRB4*0101-05 |
| G11 | DRM83 | DR04 | DR20 | DR2R37S | NEG |
| G12 | DRM84 | DR04 | DR16 | DR2R37D | DRB5*0101,04-07,09 |
| H01 | DRM85 | DR04 | DR29 | DR2R67F | DRB5*0101-05,08-10 |
| H02 | DRM86 | DR04 | DR32 | DR2R71A | DRB5*0106,0202-04 |
| H03 | DRM87 | DR04 | DR34 | DR2R74L | DRB5*0104 |
| H04 | DRM88 | DR04 | DR39 | DR2R86G | DRB5*0101-05,07-10,0203 |
| H05 | DRM89 | DR04 | DR40 | DR2R86V | DRB5*0106,0202,04,05 |
| | | | | | |
| | | | | | |
| | Mix | P1 | | P2 | |
| | | 15.0 ul | | 15.0 ul | |

Table 5

| ID | | Location | |
|------|----|------------------------|--------|
| CI06 | 3' | HLA-C Ex3 243-263 | Biotin |
| CI07 | 3' | HLA-C Ex3 243-263 | Biotin |
| CI08 | 3' | HLA-B&C Ex3 195-213 | Biotin |
| CI09 | 3' | HLA-C Ex4 234-251 | Biotin |
| CI10 | 3' | HLA-C Ex3 258-275 | Biotin |
| CI11 | 3' | HLA-C Ex3 195-213 | Biotin |
| CI12 | 3' | HLA-C Ex4 31-49 | Biotin |
| CI13 | 3' | HLA-C Ex3 134-151 | Biotin |
| CI14 | 3' | HLA-B & C Ex3 18-36 | Biotin |
| CI16 | 3' | HLA-C Ex4 4-23 | Biotin |
| CI17 | 3' | HLA-C Ex4 4-23 | Biotin |
| CI19 | 3' | HLA-C Ex3 25-42 | Biotin |
| CI21 | 3' | HLA-ABC Ex3 216-233 | Biotin |
| CI22 | 3' | HLA-A & C Ex 3 196-214 | Biotin |
| CI23 | 3' | HLA-B & C Ex3 65-84 | Biotin |
| CI24 | 3' | HLA-C Ex3 131-148 | Biotin |
| CI28 | 3' | HLA-C Ex2 229-246 | Biotin |
| CI29 | 3' | HLA-A Ex3 216-233 | Biotin |
| CI30 | 3' | HLA-ABC Ex3 216-233 | Biotin |
| CI31 | 3' | HLA-A Ex3 195-213 | Biotin |
| CI32 | 3' | HLA-A Ex3 48-64 | Biotin |
| CI35 | 3' | HLA-C Ex3 25-41 | Biotin |
| CI36 | 3' | HLA-B & C Ex3 169-185 | Biotin |
| CI44 | 3' | HLA-B Ex2 219-236 | Biotin |
| CI55 | 3' | HLA-B Ex3 195-213 | Biotin |
| CI56 | 3' | HLA-B & C Ex3 44-59 | Biotin |
| CI57 | 3' | HLA-ABC Ex3 76-92 | Biotin |
| CI58 | 3' | HLA-B & C Ex3 77-95 | Biotin |
| CI59 | 3' | HLA-B Ex3 92-111 | Biotin |
| CI60 | 3' | HLA-B Ex3 201-218 | Biotin |
| CI61 | 3' | HLA-ABC Ex3 216-233 | Biotin |
| CI62 | 3' | HLA-B Ex3 229-246 | Biotin |
| CI63 | 3' | HLA-B Ex3 260-276 | Biotin |
| CI64 | 3' | HLA-B Ex3 262-279 | Biotin |
| CI65 | 3' | HLA-B & C Ex3 10-29 | Biotin |

| | | | |
|-------|----|-----------------------|--------|
| CI66 | 3' | HLA-B Ex3 18-36 | Biotin |
| CI67 | 3' | HLA-B Ex3 184-201 | Biotin |
| CI68 | 3' | HLA-B & C Ex3 69-87 | Biotin |
| CI69 | 3' | HLA-A & B Ex3 68-85 | Biotin |
| CI70 | 3' | HLA-B Ex3 156-173 | Biotin |
| CI71 | 3' | HLA-B Ex2 173-192 | Biotin |
| CI72 | 3' | HLA-A & B Ex2 246-264 | Biotin |
| CI73 | 3' | HLA-B Ex4 168-187 | Biotin |
| CI74 | 3' | HLA-B Ex3 11-28 | Biotin |
| CI75 | 3' | HLA-B Ex2 229-245 | Biotin |
| CI76 | 3' | HLA-ABC Ex3 216-233 | Biotin |
| CI79 | 3' | HLA-B Ex3 120-136 | Biotin |
| CI82 | 3' | HLA-A & B Ex3 228-245 | Biotin |
| CI84 | 3' | HLA-B Ex3 120-136 | Biotin |
| CI86 | 3' | HLA-B Ex2 226-243 | Biotin |
| CI90 | 3' | HLA-ABC Ex3 156-172 | Biotin |
| CI91 | 3' | HLA-B Ex3 44-60 | Biotin |
| CI95 | 3' | HLA-B Ex2 207-225 | Biotin |
| CI96 | 3' | HLA-B Ex2 207-226 | Biotin |
| CI98 | 3' | HLA-B & C EX3 69-87 | Biotin |
| CI100 | 3' | HLA-ABC Ex3 216-233 | Biotin |
| CI109 | 3' | HLA-A Ex3 80-100 | Biotin |
| CI110 | 3' | HLA-A Ex3 212-229 | Biotin |
| CI111 | 3' | HLA-A Ex3 105-123 | Biotin |
| CI112 | 3' | HLA-A Ex3 71-88 | Biotin |
| CI113 | 3' | HLA-A Ex3 110-128 | Biotin |
| CI116 | 3' | HLA-C Ex3 25-41 | Biotin |
| CI117 | 3' | HLA-C EX3 183-200 | Biotin |
| CI118 | 3' | HLA-C Ex3 169-186 | Biotin |
| CI124 | 3' | HLA-B & C Ex3 195-213 | Biotin |
| CI125 | 3' | HLA-C Ex4 234-251 | Biotin |
| CI126 | 3' | HLA-C Ex3 258-275 | Biotin |
| CI127 | 3' | HLA-C Ex3 195-213 | Biotin |
| CI128 | 3' | HLA-C Ex3 18-36 | Biotin |
| CI129 | 3' | HLA-C Ex3 246-265 | Biotin |
| CI131 | 3' | HLA-B & C Ex3 76-93 | Biotin |
| CI132 | 3' | HLA-B Ex3 69-86 | Biotin |
| CI133 | 3' | HLA-A Ex3 20-39 | Biotin |

| | | | |
|----------|----|--------------------|--------|
| CI136 | 3' | HLA-A Ex2 186-205 | Biotin |
| CI137 | 3' | HLA-A Ex3 216-232 | Biotin |
| CI140 | 3' | HLA-A & B 224-262 | Biotin |
| CI143 | 3' | HLA-A Ex2 184-203 | Biotin |
| CI145 | 3' | HLA-A Ex2 226-43 | Biotin |
| CI146 | 3' | HLA-B | Biotin |
| CI149 | 3' | Internal Control | Biotin |
| C3R195G | 3' | HLA-C Ex 3 195-213 | Biotin |
| C3R195C | 3' | HLA-C Ex3 195-213 | Biotin |
| C3R076A | 3' | HLA-C Ex3 76-93 | Biotin |
| C3R076C | 3' | HLA-C Ex3 76-93 | Biotin |
| C3R076T | 3' | HLA-C Ex3 76-93 | Biotin |
| C3R075TA | 3' | HLA-C Ex3 75-93 | Biotin |

Table 6

| ID | | | PRIMER |
|------|----|--------|-----------------|
| DQ01 | 5' | Biotin | DQB 8V-1 |
| DQ02 | 5' | Biotin | DQB 26G-1 |
| DQ03 | 5' | Biotin | DQB 26La-1 |
| DQ04 | 5' | Biotin | DQB 26Y-2 |
| DQ08 | 5' | Biotin | DQB 55P-1 |
| DQ13 | 5' | Biotin | DQB 71K-1 |
| DR01 | 5' | Biotin | DR2S9-4 |
| DR02 | 5' | Biotin | DR2S10G |
| DR03 | 5' | Biotin | DR2S10L-1 |
| DR04 | 5' | Biotin | DR2S11D-2 |
| DR05 | 5' | Biotin | DR2S11R-1 |
| DR06 | 5' | Biotin | DR2S13C-2 |
| DR07 | 5' | Biotin | DR2S13G-1 |
| DR08 | 5' | Biotin | DR2S13H-2 |
| DR09 | 5' | Biotin | DR2S13R-1 |
| DR10 | 5' | Biotin | DR2S13S-2 |
| DR11 | 5' | Biotin | DR2S14K-2 |
| DR12 | 3' | | DR2R17-1R |
| DR13 | 5' | Biotin | DR2S26L-3 |
| DR14 | 5' | Biotin | DR2S26L-4 |
| DR22 | 5' | Biotin | DR2S37YA- 1 |
| DR24 | 5' | Biotin | DR2S52B-3 |
| DR85 | 5' | Biotin | DR2S11A |
| DR86 | 5' | Biotin | DR2S14b |
| | 5' | Biotin | DPA - E (PC) |